National Institute of Standards and Technology

NVLAP®

National Voluntary Laboratory Accreditation Program

ISO/IEC 17025:1999
ISO 9002:1994

Scope of Accreditation

CALIBRATION LABORATORIES **NVLAP LAB CODE 200406-0**

STRATEGIC WEAPONS FAC. PACIFIC CAL. LAB. OPER. BY LOCKHEED MARTIN
6402 Skipjack Cir. Org. 44-43, Bldg. TSB
P.O. Box 6429, NSB Bangor
Silverdale, WA 98315-6499
Mr. Miles Hoover
Phone: 360-396-8425 Fax: 360-396-8193
E-Mail: buddy.hoover@lmco.com

NVLAP Code: 20/A01 ANSI/NCSL Z540-1-1994; Part 1 Compliant

DIMENSIONAL

NVLAP Code: 20/D03
Gage Blocks - Steel and Chrome Carbide

Range in inches	*Best Uncertainty (±) in μ inches*[note 1]	*Remarks*
0.01 to 1.0	3.0	Mechanical Comparison
2.0	3.2	Mechanical Comparison
3.0	3.5	Mechanical Comparison
4.0	4.0	Mechanical Comparison
5.0	4.3	Mechanical Comparison
6.0	5.0	Mechanical Comparison
7.0	5.7	Mechanical Comparison
8.0	6.4	Mechanical Comparison

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10.0	7.9	Mechanical Comparison
12.0	9.4	Mechanical Comparison
16.0	12.2	Mechanical Comparison
20.0	15.2	Mechanical Comparison
Gage Blocks - Ceramic and Tungsten Carbide		
0.01 to 1.0	4.0	Mechanical Comparison
2.0	4.2	Mechanical Comparison
3.0	4.5	Mechanical Comparison
4.0	5.0	Mechanical Comparison

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STRATEGIC WEAPONS FAC. PACIFIC CAL. LAB. OPER. BY LOCKHEED MARTIN

NVLAP Code: 20/D11
Spherical Diameter, Plug Ring Gages

Range in inches	*Best Uncertainty (±) in μ inches*[note 1]	*Remarks*
Ring Gages		
>0 to 8.0	20	Comparison to Gage Blocks
Plug Gages		
>0 to 3.0	40	Comparison to Gage Blocks

NVLAP Code: 20/D14
Threaded Plug and Ring Gages

Threaded Plug Gages, 60°

	Range	*Best Uncertainty (±)*[note 1]	*Remarks*
Pitch Diameter	>0 to 6.0 in	90 μin	Three Wire Method
Major Diameter	>0 to 6.0 in	40 μin	Universal Measuring Machine
Pitch	4 to 80 TPI	100 μin	Universal Measuring Machine
Threaded Ring Gages, 60°			
Minor Diameter	>0 to 6.0 in	40 μin	

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STRATEGIC WEAPONS FAC. PACIFIC CAL. LAB. OPER. BY LOCKHEED MARTIN

ELECTROMAGNETICS - DC/LOW FREQUENCY

NVLAP Code: 20/E02
AC Current

Range	*Best Uncertainty (±) in ppm*[note 1]	*Frequency Range*
10 μA to 220 μA	176 to 9100	10 Hz to 10 kHz
220 μA to 2.2 mA	148 to 4300	10 Hz to 10 kHz
2.2 mA to 22 mA	148 to 3500	10 Hz to 10 kHz
22 mA to 220 mA	144 to 1580	10 Hz to 10 kHz
220 mA to 2.2 A	318 to 7800	20 Hz to 10 kHz
2.2 A to 11 A(w/5725A)	417 to 3375	40 Hz to 10 kHz

NVLAP Code: 20/E05
DC Current

Range	*Best Uncertainty (±) in ppm*[note 1]	*Remarks*
10 μA to 220 μA	74 to 360	
220 μA to 2.2 mA	39 to 71	
2.2 mA to 22 mA	37 to 58	
22 mA to 220 mA	59 to 87	

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220 mA to 2.2 A	125 to 183
2.2 A to 11 A(w/5725A)	388 to 558

NVLAP Code: 20/E05
DC Resistance

Range in ohms	*Best Uncertainty (±) in ppm*[note 1]	*Remarks*
1.0	3	Using Guildline Bridge
10.0	3	Using Guildline Bridge
100.0	3	Using Guildline Bridge
1000.0	3	Using Guildline Bridge
10000.0	3	Using Guildline Bridge
100000.0	3	Using Guildline Bridge

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NVLAP Code: 20/E06
DC Voltage

Range (±)	*Best Uncertainty (±) in ppm*[note 1]	*Remarks*
0.1 V	8.1	Compared to 10 V Reference Cell
1.0 V	1.3	Compared to 10 V Reference Cell
10.0 V	1.0	Compared to 10 V Reference Cell
100.0 V	1.0	Compared to 10 V Reference Cell
1000.0 V	1.1	Compared to 10 V Reference Cell

NVLAP Code: 20/E09
LF AC Voltage

Range	*Best Uncertainty (±) in ppm*[note 1]	*Frequency Range*
1 mV to 220 mV	126 to 28000	10 Hz to 1 Mhz
220 mV to 2.2 V	52 to 4409	10 Hz to 1 Mhz
2.2 V to 22 V	50 to 3200	10 Hz to 1 Mhz
22 V to 220 V	63 to 13348	10 Hz to 1 Mhz
220 V to 250 V	400 to 410	15 Hz to 50 Hz
220 V to 1100 V	79 to 100	50 Hz to 1 kHz

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STRATEGIC WEAPONS FAC. PACIFIC CAL. LAB. OPER. BY LOCKHEED MARTIN

220 V to 1100 V (w/5725A)	85 to 1360	40 Hz to 30 kHz

NVLAP Code: 20/E10
LF Capacitance

Range	*Best Uncertainty (±)*[note1]	*Remarks*
10 pF to 1 μF	0.0125%	GR 1620-AP Bridge System

NVLAP Code: 20/E15
Phase Meters

Range ***Best Uncertainty (±) in milli degrees***[notes 1,2]

0.000° to 999.999°

	Frequency Range in Hertz			
Amplitude and Ratio	***1 to 1 k***	***>1 k to 6.25 k***	***>6.25 k to 50 k***	***>50 k to 100 k***
5 V 1:1 ratio	5	5	10	20
50mV to 100 V 10:1 ratio	5 + 0.05R	10 + 0.1R	15 + 0.15R	40 + 0.4R
100V to 120V 100:1 ratio	10 + 0.1R	20 + 0.2R	30 + 0.3R	100 + R

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STRATEGIC WEAPONS FAC. PACIFIC CAL. LAB. OPER. BY LOCKHEED MARTIN

TIME AND FREQUENCY

NVLAP Code: 20/F01
Frequency Dissemination

Range	*Best Uncertainty (±)*[note 1]	*Remarks*
0.1 MHz	2×10^{-12}	
1 MHz	2×10^{-12}	
5 MHz	2×10^{-12}	
10 MHz	2×10^{-12}	

NVLAP Code: 20/F02
Time Dissemination

Range	*Best Uncertainty (±)*[note 1]	*Remarks*
1 pps	10 μs	

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MECHANICAL

NVLAP Code: 20/M06
Force

Range in lbs	*Uncertainty (±) in lbs*[note 1]	*Remarks*
200 to 1000	0.48	Morehouse Proving Ring
1000 to 3000	1.02	Morehouse Proving Ring
3000 to 5000	1.56	Morehouse Proving Ring
5000 to 10000	3.1	Morehouse Proving Ring
10000 to 30000	13.7	Morehouse Proving Ring
30000 to 50000	19.4	Morehouse Proving Ring
50000 to 100000	31	Morehouse Proving Ring

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STRATEGIC WEAPONS FAC. PACIFIC CAL. LAB. OPER. BY LOCKHEED MARTIN

NVLAP Code: 20/M06
Force - Torque

Range	*Best Uncertainty (±)*[note 1]	*Remarks*
2.0 lb-in to 20 lb-in	0.1% of Full Scale (FS) or 0.2% of Indicated Value (IV) whichever is greater	
10 lb-in to 100 lb-in	0.1% of Full Scale (FS) or 0.2% of Indicated Value (IV) whichever is greater	
10 lb-ft to 100 lb-ft	0.1% of Full Scale (FS) or 0.2% of Indicated Value (IV) whichever is greater	
100 lb-ft to 1000 lb-ft	0.1% of Full Scale (FS) or 0.2% of Indicated Value (IV) whichever is greater	

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STRATEGIC WEAPONS FAC. PACIFIC CAL. LAB. OPER. BY LOCKHEED MARTIN

NVLAP Code: 20/M08
Mass

Range	*Best Uncertainty (±)*[note 1]	*Remarks*
20 kg	29	Accuracy Class II
10 kg	5.9	Accuracy Class II
5 kg	4.2	Accuracy Class II
3 kg	4.2	Accuracy Class II
2 kg	4.2	Accuracy Class II
1 kg	0.5	Accuracy Class II
500 g	0.5	Accuracy Class II
300 g	0.5	Accuracy Class II
200 g	0.5	Accuracy Class II
100 g	0.13	Accuracy Class II
50 g	0.09	Accuracy Class II
30 g	0.09	Accuracy Class II
20 g	0.09	Accuracy Class II
10 g	0.03	Accuracy Class II
5 g	0.013	Accuracy Class II

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STRATEGIC WEAPONS FAC. PACIFIC CAL. LAB. OPER. BY LOCKHEED MARTIN

3 g	0.012	Accuracy Class II
2 g	0.012	Accuracy Class II
1 g	0.005	Accuracy Class II
500 mg	0.005	Accuracy Class II
300 mg	0.005	Accuracy Class II
200 mg	0.005	Accuracy Class II
100 mg	0.005	Accuracy Class II
50 mg	0.005	Accuracy Class II
30 mg	0.005	Accuracy Class II
20 mg	0.005	Accuracy Class II
10 mg	0.005	Accuracy Class II
5 mg	0.005	Accuracy Class II
3 mg	0.005	Accuracy Class II
2 mg	0.005	Accuracy Class II
1 mg	0.005	Accuracy Class II

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Range	*Best Uncertainty (±) (mg)*[note 1]	*Remarks*
1/32 oz	0.012	Accuracy Class II
1/16 oz	0.013	Accuracy Class II
1/8 oz	0.016	Accuracy Class II
1/4 oz	0.023	Accuracy Class II
1/2 oz	0.087	Accuracy Class II
1 oz	0.101	Accuracy Class II
2 oz	0.104	Accuracy Class II
4 oz	0.141	Accuracy Class II
8 oz	0.46	Accuracy Class II
1 lb	0.48	Accuracy Class II
2 lb	0.57	Accuracy Class II
3 lb	1.18	Accuracy Class II
5 lb	5.07	Accuracy Class II
10 lb	6.8	Accuracy Class II
20 lb	25.7	Accuracy Class II
25 lb	22.1	Accuracy Class II

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STRATEGIC WEAPONS FAC. PACIFIC CAL. LAB. OPER. BY LOCKHEED MARTIN

50 lb 54 Accuracy Class II

RF/MICROWAVE

NVLAP Code: 20/R02
RF/Microwave Termination

Reflection Coefficient (or Scattering Parameters S_{ii})

			Frequency in Hz			
Connector Type	***Quantity***	***Quantity Range***	***0.045 to 2 G***	***2 G to 8 G***	***8 G to 18 G***	***18 G to 20 G***
APC-3.5	S_{ii}	0 to 1	0.005 to 0.011	0.005 to 0.013	0.006 to 0.017	0.006 to 0.017
APC-3.5	Arg(S_{ii})	$0 < \lvert S_{ii} \rvert < 1$-180° to +180°	0.6 to 180	2.2 to 180	4.4 to 180	4.8 to 180
N	S_{ii}	0 to 1	0.004 to 0.08	0.008 to 0.017	0.008 to 0.026	--
N	Arg(S_{ii})	$0 < \lvert S_{ii} \rvert < 1$-180° to +180°	0.6 to 180	2.6 to 180	4.7 to 180	--

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STRATEGIC WEAPONS FAC. PACIFIC CAL. LAB. OPER. BY LOCKHEED MARTIN

NVLAP Code: 20/R12
RF/Microwave Bolometer Units

Range	*Frequency in Hz*	*Uncertainty (±) in %*[note 1]
10 μW to 25 mW	10 M to 1 G	2.5
10 μW to 25 mW	1 G to 8 G	2.5
10 μW to 25 mW	8 G to 18 G	3.25

NVLAP Code: 20/R13
RF/Microwave Attenuators

Attenuation (or Scattering Parameters S_{ij})

			Frequency in Hz			
Connector Type	*Quantity*	*Quantity Range*	*0.045 to 2 G*	*2 G to 8 G*	*8 G to 18 G*	*18 G to 20 G*
APC-3.5	S_{ij}	0 to 20 dB	0.05 to 0.07	0.07	0.1	0.1
		20 to 40 dB	0.07 to 0.36	0.07	0.1 to 0.11	0.1 to 0.11
		40 to 60 dB	--	0.07 to 0.2	0.11 to 0.32	0.11 to 0.32
N	S_{ij}	0 to 20 dB	0.03 to 0.05	0.05	0.09	--
		20 to 40 dB	0.05 to 0.35	0.05	0.09	--
		40 to 60 dB	--	0.05 to 0.19	0.09 to 0.32	--

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THERMODYNAMICS

NVLAP Code: 20/T02
Humidity

Range	*Best Uncertainty (±)*[note 1]	*Remarks*
10 to 95% rH	1.2% rH	Thunder Scientific 2500

NVLAP Code: 20/T03
Laboratory Thermometers

Range	*Best Uncertainty (±)*[note 1]	*Remarks*
0 to 260 °C	0.0076 °C	Comparison to SPRT

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NVLAP Code: 20/T05
Pressure - Absolute

Range in psi	*Best Uncertainty (±) of reading*[note 1]	*Remarks*
0.2 to 25	$3.2 \times 10^{-5} + 0.00096$ psi	Low Pressure Piston
25 to 500	$3.2 \times 10^{-5} + 0.00346$ psi	High Pressure Piston
Pressure - Gage		
>0 to 100	$2.4 \times 10^{-5} + 0.0026$ psi	
>100 to 1000	$2.4 \times 10^{-5} + 0.06$ psi	
>1000 to 2000	$5.2 \times 10^{-5} + 0.06$ psi	
>2000 to 10000	$5.2 \times 10^{-5} + 0.7$ psi	

1. Represents an expanded uncertainty using a coverage factor, k=2.
2. R is the ratio of the larger output voltage to the smaller output voltage.

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